

**ARIZONA GAME AND FISH DEPARTMENT
HABITAT PARTNERSHIP PROGRAM
HABITAT ENHANCEMENT AND WILDLIFE MANAGEMENT PROPOSAL**

PROJECT INFORMATION	
Project Title: Large Predator Habitat Connectivity and Population Persistence	Project No. 09-707
Region/GMU: Region V GMUs 29, and 30A	HPC:
Project Type: Research	
Project Description: Genetic analysis of black bear and cougar samples collected across Arizona and focused on the Sky island region of southeast Arizona. Data from genetic samples collected across the state will provide information on population levels, demographics, and relatedness for black bear and cougar populations. Genetic samples have already been collected with concentrated efforts on black bears in the Chiricahua Mountains (GMU 29 and 30A) and along the Mogollon Rim (GMU 4A).	
Wildlife Species to Benefit: Black bear and Cougar	
Possible Funding Partners: University of Arizona, Federal Aid	
Implementation Schedule: Beginning: October 2009 Completed: May 2010	NEPA Compliance: (if applicable) NA Completed: Yes ____ No ____ Projected Completion Date: June 2011
PROJECT FUNDING	
SBG Funds Requested: \$16,000.00	
Cost Share Funds: \$40,000.00	
Total Project Costs: \$56,000.00	
PARTICIPANT INFORMATION	
Applicant: Kirby Bristow, Research Branch (please print) Telephone: 623-236-7221	Address: Arizona Game and Fish Department Research Branch 5000 W Carefree Hwy Phoenix, AZ 85086
AGFD Contact and Phone No. (If applicant is not AGFD personnel)	
Coordinated with: WMGM (Ron Thompson), FOR5 (Fink, Heffelfinger, Aubuchon, Bacorn, Gonzalez, Frieburg, Fulk) U of A (Melanie Culver) USFS (Richard Gerhardt) US Army (Sheridan Stone)	Date:
Applicant's signature:	Date:

SEND COMPLETED APPLICATIONS TO:
Game Branch
2221 W. Greenway Rd.

(revised 7-02-2007)

Phoenix, AZ 85023
mdisney@azgfd.gov

WAS PROJECT PRESENTED TO THE LOCAL HPC? YES _____ NO X

HAS PROJECT BEEN SUBMITTED IN PREVIOUS YEARS? IF SO WAS IT FUNDED?
NO

NEED STATEMENT/PROBLEM ANALYSIS:

Cougar (*Puma concolor*) and black bear (*Ursus americana*) are charismatic species that engage public interest and, from a conservation perspective, need large areas of suitable habitat in which to persist. In the Sonoran Desert, suitable cougar and bear habitat is distributed mostly within mountain ranges (i.e., “Sky Islands”) embedded in a matrix of inhospitable lowland desert. In this “Sky Island” region, cougars and bears are distributed as metapopulations— isolated populations connected by dispersal. Thus for large carnivores to persist within this landscape, linkages connecting isolated Sky Island habitats must be maintained.

Anthropogenic disturbance such as urbanization and highway development is altering the distribution of suitable habitat and severing corridors that connect them. To ensure the future viability of black bear and cougar populations in the Sky Islands, we need to assess population connectivity, genetic variation, and population parameters that will help identify and maintain remaining suitable habitats and the linkages that connect them. This information could be used to adjust management practices as the distribution of the habitats and corridors continues to be altered. Information on genetic relatedness, diversity and population demographics is needed to help guide management practices that maintain viable carnivore populations in Arizona.

PROJECT OBJECTIVES:

- 1 Determine predator population levels and sex ratios in selected mountain ranges (GMUs 4A, 29, and 30A)
- 2 Model meta-population structure of isolated predator subpopulations
- 3 Determine genetic relatedness among predator subpopulations.
- 4 Test habitat linkage models based on predator genetic structure. Because of the long generation time of the focal species, resulting models will reflect metapopulation structure due to “historic” linkage corridors.
- 5 Use validated models to predict how suitable habitat patches and linkages may be modified according to future anthropogenic activity.

PROJECT STRATEGIES:

Cougar and bear samples will be analyzed using standard microsatellite techniques at University of Arizona. We will use a Bayesian model-based clustering method in program STRUCTURE to assign individuals/virus samples to populations. For population-based analyses, we will use a hierarchical clustering algorithm to group nearest individuals. Hierarchical clustering is a step-based approach that groups the closest pair of individuals, clusters, or individual-cluster pair based on Euclidean distances. Following a cluster routine, a new centroid location is generated representing the geographical center of all individuals in the cluster. We will allow individuals and clusters to merge at distances equal to or under the average dispersal distance of focal species. We will use the program FSTAT to calculate descriptive statistics and genetic distances for sample groups. We will use Mantel tests to test for correlations between geographical and genetic distances. If Mantel tests indicate splits between any geographical groups, we will use partial Mantel tests to assess how much additional genetic differentiation can be attributed to the geographic barrier(s).

PROJECT LOCATION:

Most of the samples were collected in Arizona Game and Fish Department Region V in the Sky Island regions especially the Chiricahua Mountains in GMU 29, and 30A.

LAND OWNERSHIP AT PROJECT SITE (Please state specifically if PRIVATE PROPERTY and provide landowner's name):

Landownership is a mix of Federal, state and private land; most of the area where field work was conducted is USFS or National Monument. However, all field work has been completed, this proposal is to fund laboratory analysis of collected genetic samples.

IF PRIVATE PROPERTY, IS THERE A STEWARDSHIP AGREEMENT BETWEEN THE LANDOWNER AND THE DEPARTMENT?

HABITAT DESCRIPTION:

Most of the samples were collected in Mixed Conifer, Poderosa Pine, Pinyon Juniper, Madrean evergreen woodland and semi-desert grassland in the Sky Island regions of southeast Arizona.

ITEMIZED USE OF FUNDS:

Laboratory Work	Cost	Quantity	Total
University of Arizona genetics research assistant/month	2583	4	10,332.0
DNA extraction (per sample) & microsatellites	16.7	200	3,340.0
primer purchase (fluorescently labeled loci)	76.5	15	1,147.5
Indirect costs (10%)	14,819	0.1	1,481.9
Total			16,300.9

LIST COOPERATORS AND DESCRIBE POTENTIAL PARTICIPATION:

Melanie Culver, University of Arizona Genetics Laboratory

PROJECT MONITORING PLAN:

Research Branch will act as liaison between the University of Arizona Genetics Laboratory and Arizona Game and Fish Department. Quarterly progress reports of genetic analysis will be required according to M.O.U. agreement.

PROJECT MAINTENANCE:

PROJECT COMPLETION REPORT TO BE FILED BY:

Kirby Bristow
Research Biologist
Arizona Game and Fish Department

WATER DEVELOPMENT PROJECTS (see attached worksheet):

TREE SHEARING (AGRA-AXE, PUSH) PROJECTS (see attached worksheet):